Secant

* The user should guarantee that the function f(X) is continuous.

1) Ask the user for the function f(X), the tolerance, and the maximum number of iterations.

2) Ask the user for two initial values we will call X_0 and X_1

3) We evaluate X_0 and X_1 in the function to obtain $f(X_0)$ and $f(X_1)$. If $f(X_0) = 0$ or $f(X_1) = 0$, then we will tell the user that this is the root

4) Now we find the following value of X by storing it in the variable X_n ... we find it using the following formula : $X_n = X_1 - [f(X_1)* (X_1 - X_0) / f(X_1) - f(X_0)]$ then we evaluate this in the function f(X)... if this answer gives zero, then we alert the user that this is the root.

5) We make an iterations counter, calling it n and we start with 1

6) Error $= | X_1 - X_n |$

7) Now we make a cycle.... While the error $>$ tolerance, $f(X_n) \neq 0$, n<max number of iterations, do:

   a) $X_0 = X_1$

   b) $X_1 = X_n$

   c) $f(X_0)$ = the new value of X_0 evaluated in the function

   d) $f(X_1)$ = the new value of X_1 evaluated in the function

   e) $X_n = X_1 - [f(X_1)* (X_1 - X_0) / f(X_1) - f(X_0)]$ (with the new values)

   f) $f(X_n)$ = the new value of X_n evaluated in the function

   g) n = n+1

      (i) inside the function we put a conditional , that if $f(X_1) - f(X_0) = 0$, as the denominator will be zero we tell the user that he cannot continue with the method given that the denominator is zero and that the root is approximately X_n (final value) with an error of :___(with the final value of the error)

8) If the error $\leq$ tolerance, tell the user that the root is approximately X_n (final value) with an error of _____(with the final value of the error)

9) If $f(X_n) = 0$ tell the user that X_n is the root.

10) If n is equal to the number of iterations tell the user that he has reached the maximum number of iterations and that the root will be approximately X_n (final value) with an error of____(with the final value of the error)